MODEL MP

With Extendable Axles
Featuring "Electro-Proportional"
Control System

SERVICE MANUAL

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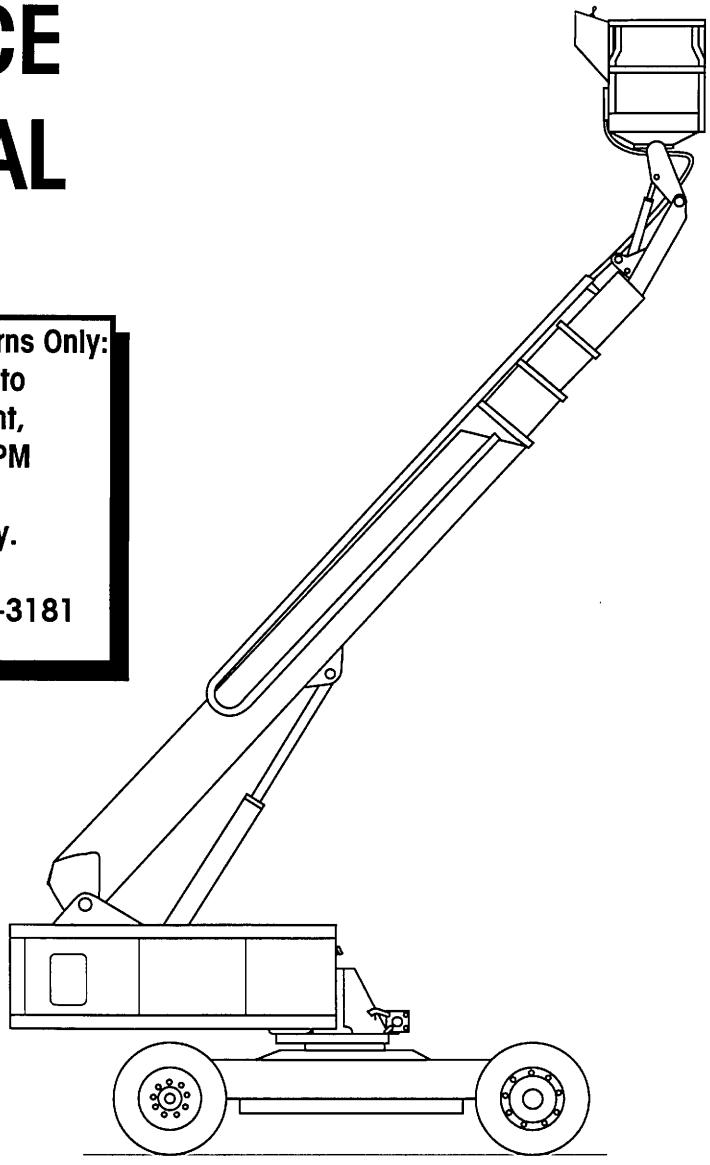


Art # A00.00130E

Part No. 89-103317 • Initial Issue dated Aug. 1995 •

MACHINE SPECIFICATIONS MP 95

Working Height	**101 Ft/** 30.78 M
Platform Height	**95 Ft/** 28.96 M
Horizontal Reach (Boom Angle 0°)	**82 Ft 6 In./** 25.15 M
Platform Capacity (Unrestricted)	**500 LBs./** 227 kg
Platform Size	**36 In. x 72 In. x 42 In./** 0.91M x 1.83 M x 1.07 M
Stowed Length	**40 Ft 8 In./** 12.4 M
Stowed Height	**9 Ft 6 In./** 2.90 M
Machine Width:	
without axles extended	**8 Ft 2 In./** 2.49 M
with axles extended	**11 Ft 8 In./** 3.56 M
Wheelbase	**10 Ft 0 In./** 3.04 M
Outside Turning Radius	**26 Ft 0 In./** 7.92 M
Maximum Travel Speed:	
Boom Stowed (see Note 1)	**2.6 MPH/** 4.2 KPH
Boom Extended	**0.5 MPH/** 0.8 KPH
Ground Clearance	**14 In./** 35.6 cm
Gross Weight (approx.) (Note 1)	**46,850 LBs./** 21,251 kg
Gradeability (on Hard Surface) (see Note 1)	**7.5°/** 13%
Platform Rotation	**180°**
Superstructure Rotation	**360° continuous, either direction**
Tire Size	**15 x 22.5 (16 Ply) liquid ballasted**
Tire Pressure (Disregard for foam filled tires)	**110 PSI/** 7.58 Bar/ 7.73 Kg/ cm^2
Wheel Lug Nut Torque	**220 Ft LBs./** 298 Nm/ 30.4 Kg-m
Swing Bearing Bolt Torque	**280 Ft LBs./** 380 Nm/ 38.7 Kg-m
Drive Hub Bolt Torque	**170 Ft LBs./** 231 Nm/ 23.5 Kg-m
Maximum Hydraulic Pressure	**3000 PSI/** 207 Bar/ 211 Kg/ cm^2
Hydraulic Reservoir Capacity	**55 Gal./** 208 Liters
Fuel Reservoir Capacity	**57 Gal./** 216 Liters
Electrical System	**Three 12 Volt DC Batteries 95 Amp**

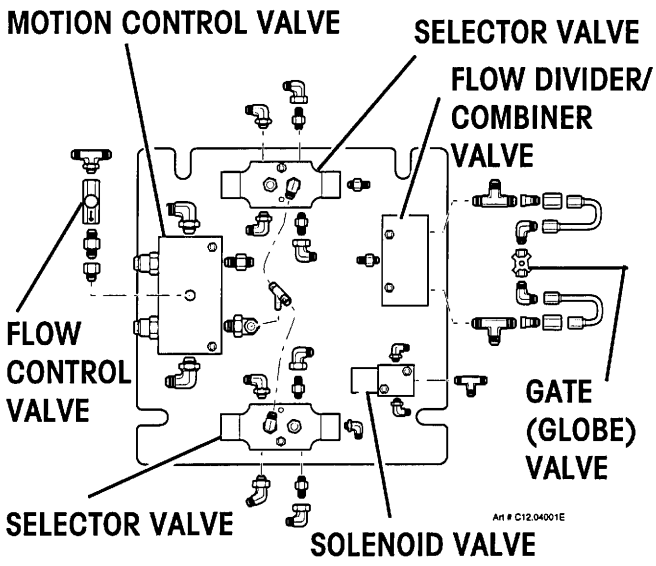
Engine Availability:

Standard . . . Ford CSG 649, 110 HP (82 Kw), Liquid Cooled, Gasoline

Optional . . . Ford CSG 649, 110 HP (82 Kw), Liquid Cooled, Dual Fuel
Deutz F4L912, 71 HP (53 Kw), Air Cooled, Diesel Fuel
Isuzu, 88 HP (66 Kw), Liquid Cooled, Diesel Fuel
Perkins 4.236, 81 HP (60 Kw) Liquid Cooled, Diesel Fuel

Note 1: Weight and performance shown represent typical machines, and should be used as a general guideline only. Many variables between machines can lead to significant differences in these factors. Accurate figures, when necessary for a particular application, can best be determined by testing of the specific machine.

SECTION 1: TRANSPORTATION AND EMERGENCY PROCEDURES



Drive Valve Assembly for Four (4) Wheel Drive.

Gate Valve

The gate (globe) valve allows hydraulic fluid to transfer from one drive motor to the other. When making turns the outside tire turns faster and requires more hydraulic fluid flow. Since the flow divider gives each motor equal flow the globe valve will allow the transfer of hydraulic fluid from the inside wheel to the outside wheel and prevent tire scrubbing on hard surfaces. For good performance in most conditions, the setting should be 1-1/2 turns open from the closed position.

Motion Control Valve

The motion control valve restrains return flow from the drive motors to prevent cavitation and the drive motors from running ahead of pump flow. Also located in the motion control valve manifold is a shuttle valve which provides hydraulic pressure to release the drive motor brakes in either forward or reverse. This valve set-up controls speed on a slope (runaway).

Flow Control Valve

The flow control valve meters the hydraulic fluid flow released from the spring applied hydraulically released brake assemblies for a smooth braking action. The valve setting is 2 to 3 turns from the closed position.

SELECTOR VALVE ASSEMBLY

The selector valve assembly consists of three valves: one double parallel selector valve and two pilot operated crossover check valves. This valve assemby determines whether fluid flows to the steer cylinder or the axle extend cylinders.

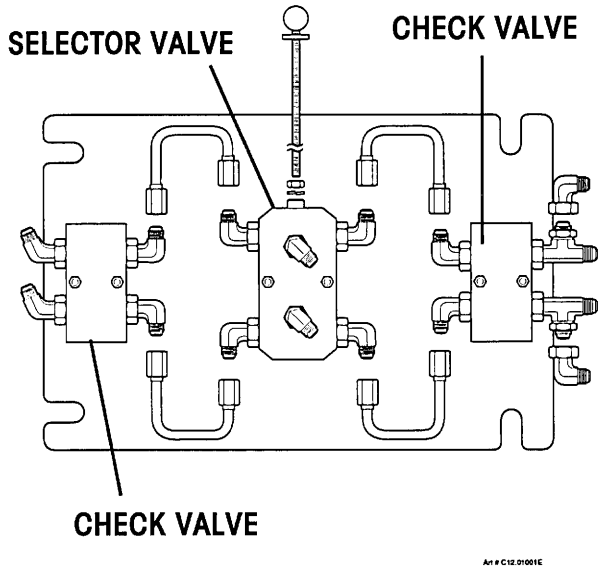
Selector Valve

A manually operated 6-way, 2-position valve. Located in the hydraulic fluid line between the hydraulic swivel and the steer cylinder. Hydraulic fluid from the steer valve segment of the ground control bank enters the selector valve and is directed to go to either steer cylinder or the axle extend cylinders.

Check Valve

One pilot operated crossover check valve prevents axle cylinder drift by preventing fluid flow to return from the axle cylinder. This allows the axle cylinder to remain extended until fluid flow is applied to retract the cylinder.

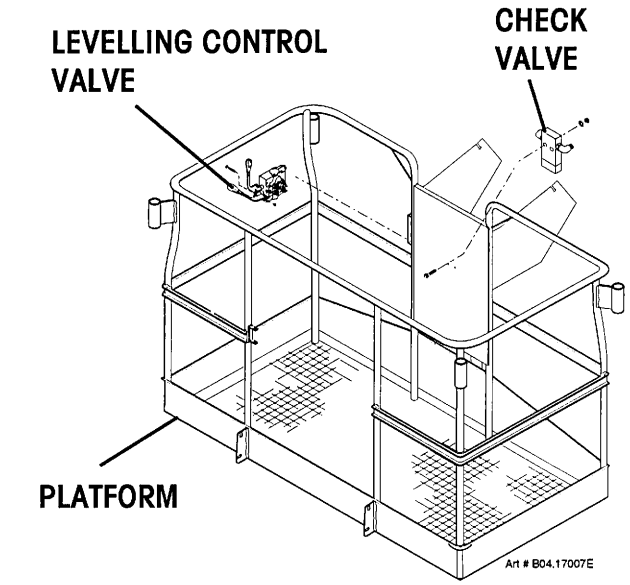
The other pilot operated crossover check valve is in the steer system and prevents return fluid flow from the steer cylinder. Thus requiring the steer cylinder to be returned to the neutral position by applying fluid flow to the steer cylinder in the opposite direction.

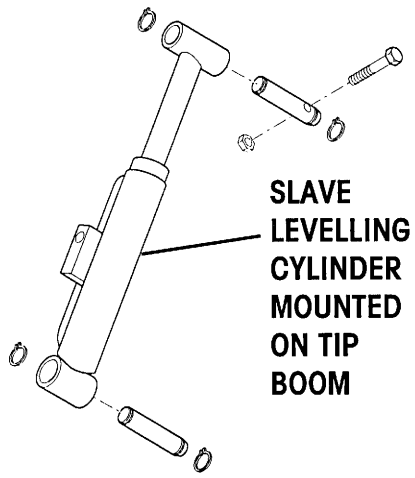


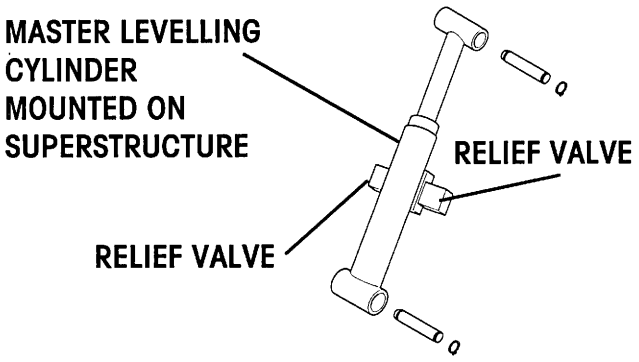
Selector Valve Assembly.

PLATFORM LEVELLING SYSTEM

The platform levelling system consists of a levelling control valve, slave levelling cylinder with a counterbalance (holding) valve, master levelling cylinder, double pilot operated check valve and two relief valves.







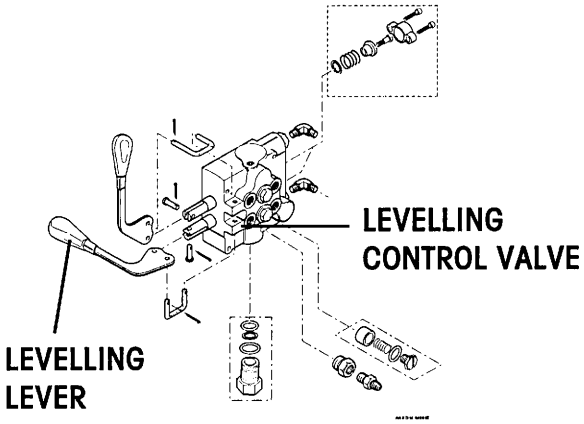
Platform Levelling System Components.

The platform levelling system automatically keeps the platform level, using a master/ slave cylinder arrangement. As the boom is raised or lowered, fluid is forced from one cylinder to the other in a closed loop, which keeps the platform parallel to the ground in any boom position. Due to slight internal leakage, fluid may at times need to be added to the levelling circuit through the platform levelling control valve.

The platform levelling system is only controlled from the platform.

LEVELLING CONTROL VALVE

This valve is a three position, four way valve which is manually operated. This control valve directs fluid flow to the levelling functions.



Levelling Control Valve.

CHECK VALVE

The double pilot operated check valve acts as a locking component for the levelling function and allows the automatic levelling function to control platform levelling. When the manual levelling circuit is activated, partial flow is piloted over to the return side to open the check valve and thus allow manual control of levelling.

ELECTRICAL SYSTEM

The following section is a description of maintenance for the major electrical components of the machine.

BATTERY

Two 12 volt batteries supply the electrical current required to operate the electrical circuits. An additional 12 volt battery is used to supply the electrical current for the emergency pump.

BATTERY MAINTENANCE (IN STORAGE)

Follow these procedures for maintenance of batteries on a machine not in use:

Keep batteries clean. Electrolyte of "wet" batteries should be checked regularly, and kept 1/2 inch above the top of the separators.

Never stack one battery directly on top of another, because post or container damage can result. If batteries are stored individually, place supporting wooden boards between layers. Do not stack more than three high, and rotate stock so that the oldest batteries are used first.

"Wet" batteries should be kept fully charged. A "wet" battery, while in storage, should be recharged to full charge at the following intervals:

If stored at:	Recharge:
Below 40° F (4° C)	None required
40° to 60° F (4° to 15° C)	Every 2 months
Above 60° F (15° C)	Every month

BATTERY MAINTENANCE (IN USE)

Follow these procedures for maintenance of batteries on a machine in use:

Check battery and surrounding area for signs of damage or corrosion.

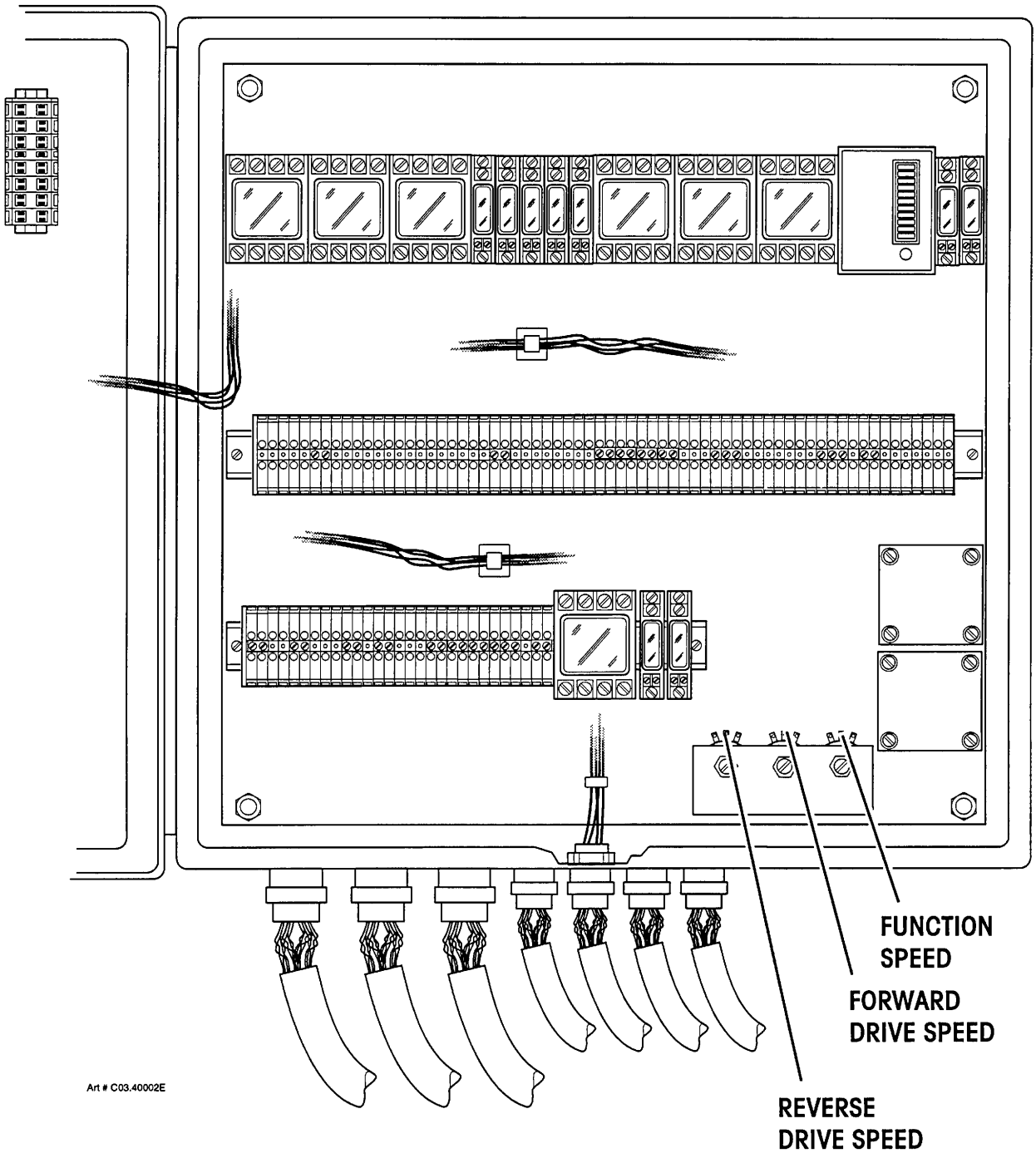
Check battery terminals for:

- **Corrosion**. Regularly clean connections and apply a non-metallic grease or protective spray to posts to retard corrosion.
- **Loose connections.** Be sure all cable connections are tight, and that good contact is made with post terminals.
- **Broken or frayed cables.** Be sure all cable connections are good, and that no loose or broken wires are exposed. Replace as needed.

Check battery electrolyte level. Replenish the electrolyte, if necessary. Remove vent caps before filling, and USE ONLY DISTILLED WATER. Fill all cells to the proper level. Do not overfill. Fill to level indicator (or 1/2 inch over the top of the separators if there is no level indicator). Fill after charging to prevent overflow of acid due to expansion. Do not use a hose to add water to batteries.

Allowing the electrolyte level to drop below the top of the separators will lead to shortened battery life. Excessive water usage can indicate that a battery has been overcharged, has been subjected to excessively high temperatures, or is nearing the end of its service life.

Keep battery clean. Wash the top of the battery, making sure all vent caps are in place. Do not allow cleaning water or other foreign matter to enter the cells. Use a solution of bicarbonate of soda and water to wash the battery if there is an acid accumulation.



CLOCKWISE = SPEED DECREASE
COUNTERCLOCKWISE = SPEED INCREASE

Ground Control Adjustments for Boom Functions and Drive Speed.

AXLE TUBE ASSEMBLY REPLACEMENT

The axle tube assembly is extended or retracted by the axle extend cylinder. Replace the tube assembly if bent or damaged.

To remove rear drive axle tube assembly:

1. Chock the steer wheels. Raise and support the machine at the rear drive end.

⚠WARNING

LIQUID BALLASTED OR FOAM FILLED TIRES ARE EXTREMELY HEAVY. CARE MUST BE TAKEN TO AVOID PERSONAL INJURY.

2. Remove tire and wheel assembly at each end:
   a. Loosen and remove the lug nuts.
   b. Pull off the tire and wheel assembly.
3. Remove drive hub assembly at each end:

⚠ CAUTION

Plug all open hydraulic fittings to prevent contamination by dirt or other foreign objects.

   a. Disconnect hoses to the drive hub assembly. At this point remove the hose carrier from the axle tube assembly and lay aside the hoses and hose carrier.
   b. Loosen and remove eight capscrews and flat washers on the drive hub assembly.
   c. Slide off hydraulic motor with torque hub as one unit.
4. Remove axle extend cylinder:
   a. Remove axle extend cylinder trunnion mounted retainer.
      1. Loosen and remove four capscrews holding the trunnion mounted retainer.

NOTE: You will have to crawl under the undercarriage to access the four capscrews and retainer.

      2. Remove the axle extend cylinder trunnion mounted retainer.
   b. Remove axle stop bar.
      1. Remove two capscrews and lockwashers.
      2. Remove axle stop bar.

NOTE: You will have to crawl under the undercarriage to access and remove the axle stop bar.

   c. Retract the axle extend cylinder (if not already retracted).

⚠ CAUTION

Plug all open hydraulic fittings to prevent contamination by dirt or other foreign objects.

   d. Disconnect hoses to the axle extend cylinder.
   e. Remove retaining ring and axle cylinder pin at the rod end of the axle cylinder.
   f. Pull axle extend cylinder out from the rod end.
5. Remove mechanical axle stop.
6. Remove lower outer axle tube wear plate.
7. Slide the axle tube assembly out. Slide out the inner axle tube assembly first.

THREE PIECE BOOM

Boom Disassembly

NOTE: This procedure requires two people. Do not attempt the procedure alone.

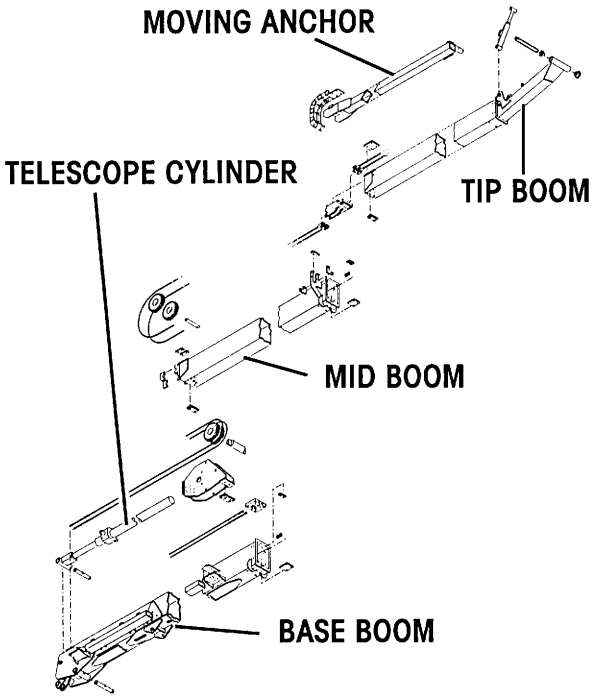
1. Retract the boom and move it to the horizontal position centered between the drive wheels.

NOTE: Boom sections must be fully retracted to remove the telescope cylinder.

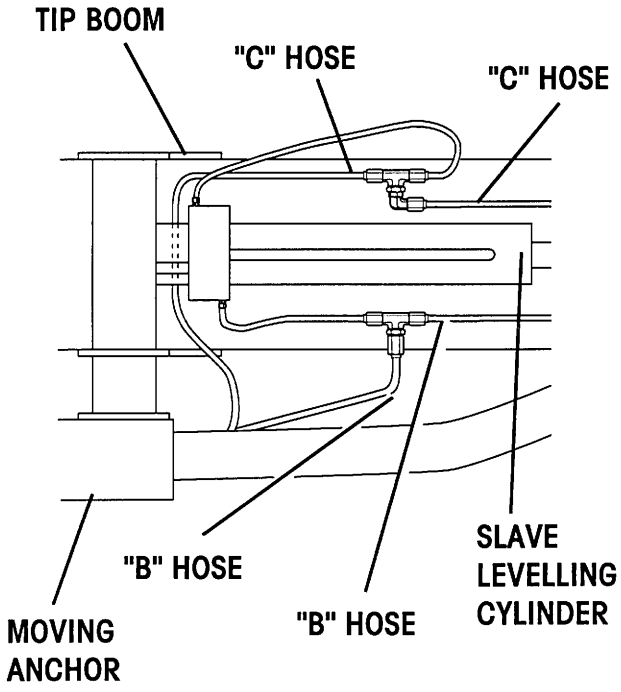
2. To remove the platform:

⚠ CAUTION

Plug all open hydraulic fittings to prevent contamination by dirt or other foreign objects.



Three Piece Boom.



Hose Disconnect Locations.

A. Disconnect the two hoses marked "B" from the tee. Plug the ends of the hoses and the tee.

B. Then disconnect the two hoses marked "C" from the tee. Plug the ends of the hoses and the tee.

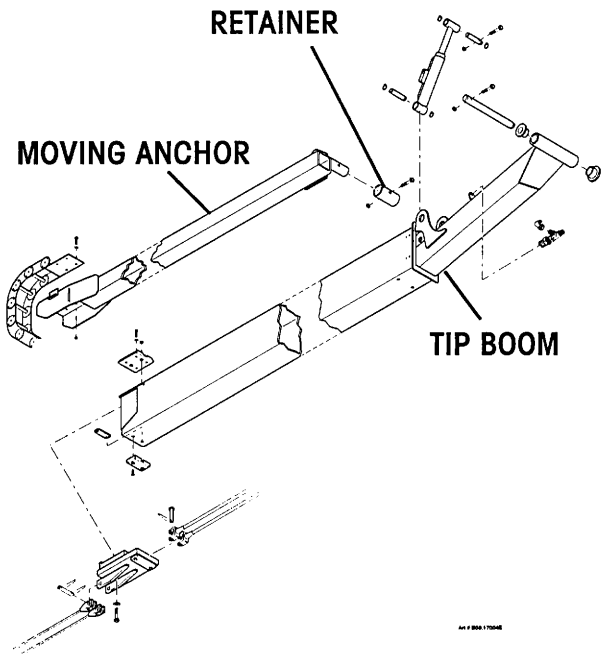
C. Remove the hoses from the hose clamp.

Boom Wire Rope Replacement (Continued)

H. Release the moving anchor from the tip boom. Remove the capscrew and nut holding the retainer to the moving anchor and the tip boom. Support the moving anchor.

⚠ CAUTION

Support the moving anchor with a boom stand or similar rigid platform.



Moving Anchor Removal.

3. Remove mid and tip boom sections and telescope cylinder, as one unit from the base boom assembly. This will require disconnecting:

⚠ CAUTION

Support the base boom with a boom stand or similar rigid platform.

A. Hoses to the rod end of telescope cylinder.

B. The telescope cylinder rod end pin.

C. The extend ropes to the front (lower) end of the base boom section.

D. The bottom boom wear pad and tapped block from the front (lower) end of the mid boom section.

E. All wear pads from the upper (rear) end of the base boom section.

F. The retract wire rope anchor at the top of the base boom section upper (rear) end.

G. Use a crane to slide out the mid and tip booms, as one unit. Place mid and tip boom assembly on low boom stands or similar rigid platforms.

4. Remove the split half trunnion brackets with wire ropes which attach the telescope cylinder housing (case) to the mid boom section. Hold cylinder and booms with a crane and also remove wear pad and stop plate on bottom of mid boom and tip boom. Lower cylinder and booms with a crane.

5. Remove the bolted bracket and wear pad anchoring the ends of the retract and extend ropes on the lower (front) end of the tip boom section.

6. Lift and slide the telescope cylinder out the lower end of the mid boom section.

7. Remove all of the rope guides on the housing of the telescope cylinder to allow the removal of the extend and retract wire ropes from the cylinder.

8. Remove the wire ropes.

Boom assembly (Continued)

9. Slide outer mid boom (third stage) and wire ropes into inner mid boom (second stage) far enough to hook up the two extend wire ropes; then pull outer mid boom (third stage) and tip boom (fourth stage) back out enough to access sheaves.

10. Install wear pads onto rear of inner mid boom (second stage). To install bottom rear wear pads, lift outer mid boom (third stage).

11. With wire ropes threaded inside inner mid boom, install cable support block. Ensure wire ropes are not crossed.

12. Install inner mid boom (second stage) sheaves with wire ropes, by inserting retract rope sheave shaft and retaining rings. The sheaves, bearing and shaft should be packed with grease before installation.

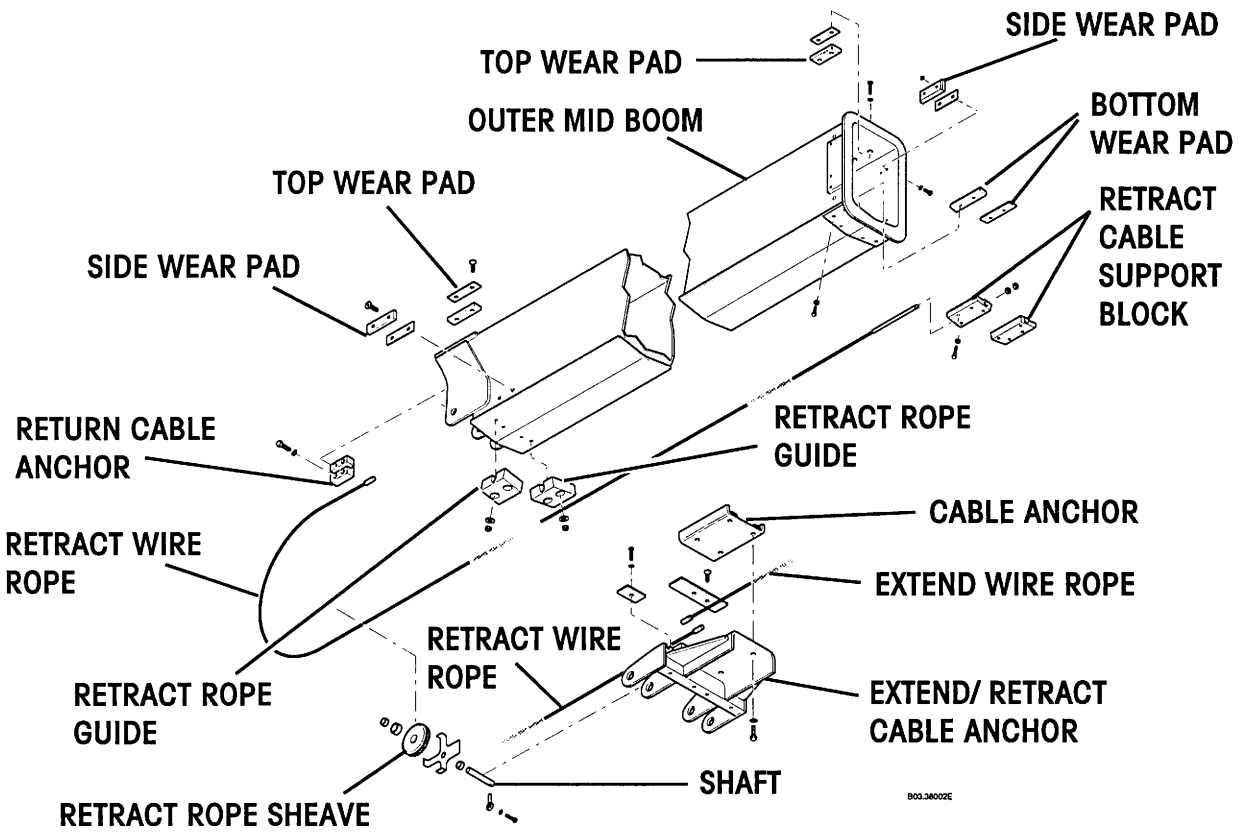
13. Install retract rope guides onto inner mid boom (second stage).

14. While supporting the telescope cylinder, install the two telescope cylinder trunnion rings. Also, install retract rope guides and wire ropes onto inner mid boom (second stage).

15. Remove access plate from top side of base boom.

16. With wire ropes temporarily fixed to the top side of inner mid boom, slide inner mid boom (second stage) into base boom (first stage) until it reaches the middle of the access plate.

17. Install wear pads to rear of base boom. For bottom wear pads and retract cable support block, the mid boom must be lifted up. Use Loctite on all bolts in top pads.



Outer Mid Boom (Third Stage).

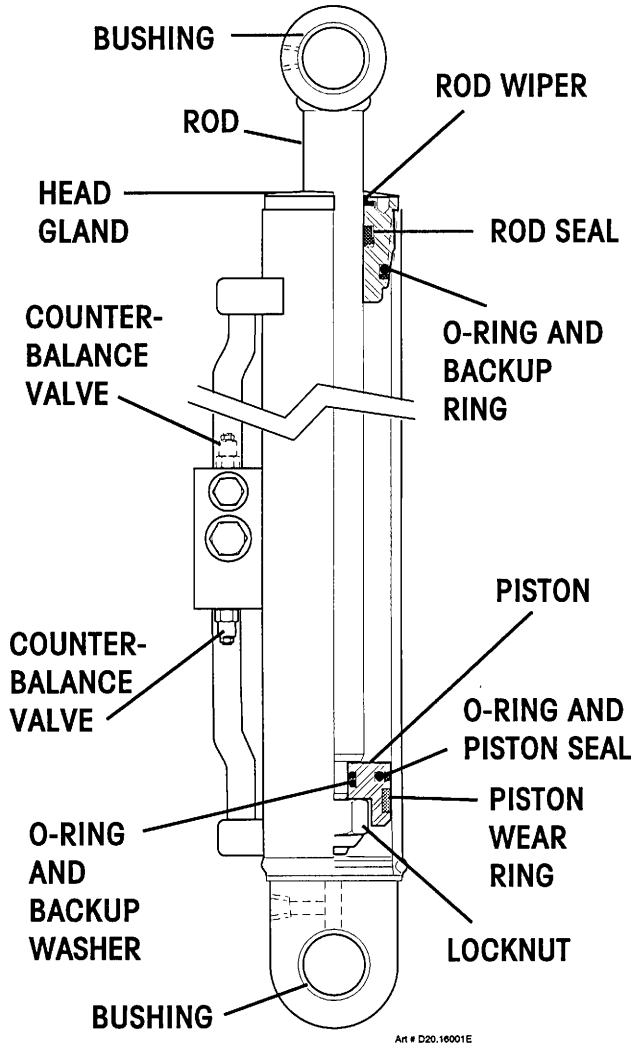
SLAVE LEVELLING CYLINDER SEAL REPLACEMENT

Lower the upper boom. SUPPORT THE PLATFORM to release the load on both master and slave levelling cylinders. Slave levelling cylinder seals can be replaced while the cylinder is on the machine or with the cylinder removed from the machine.

1. Clean the rod end of the cylinder.

2. Unscrew the end cap and pull the cap and rod straight out of the cylinder barrel. TAKE CARE NOT TO DAMAGE THE ROD SURFACE, AND GUARD AGAINST DIRT ENTERING THE SYSTEM.

3. Remove the split pin and nut from the end of the rod.



Slave Levelling Cylinder.

4. Slip off the collar.

5. Examine the rod and seals for signs of damage or wear.

6. Remove the old seals and install a new seal kit.

PLATFORM LEVELLING PROCEDURE

After a platform levelling cylinder has been repaired or replaced, or if the platform does not remain level with the raising and lowering of the boom, the platform levelling circuit may need to be bled.

With the platform near ground, operate the platform levelling control to move the platform fully backward and forward. Perform procedure five (5) times in order to expel any air from the system.

⚠ CAUTION

CARE MUST BE TAKEN WHEN OPERATING LEVELLING CONTROL. AIR IN CYLINDERS CAN CAUSE UNCONTROLLED PLATFORM MOTION.

After bleeding the levelling circuit, raise upper boom to full elevation and then fully lower boom. Check platform levelling operation.

MONTHLY OPERATIONAL CHECKLIST

DATE: _____ **INSPECTED BY:** _____

MODEL NUMBER: _____ **SERIAL NUMBER:** _____

These checklists can be copied as needed to aid in performing these inspections.

GENERAL INFORMATION

1. Keep inspection records up-to-date.
2. Record and report all discrepancies to your supervisor.
3. A dirty machine cannot be properly inspected.
   Keep your Simon machine clean!!

⚠WARNING

THIS CHECKLIST MUST BE USED AT MONTHLY INTERVALS OR EVERY 100 HOURS, WHICHEVER OCCURS FIRST. FAILURE TO DO SO COULD ENDANGER THE LIFE OF THE OPERATOR. ALWAYS REMEMBER, A LITTLE PREVENTIVE MAINTENANCE CAN SAVE MUCH MORE THAN IT COSTS.

INITIAL	DESCRIPTION
_____	1. Perform all checks listed on Shift Operational Checklist.
_____	2. Lubricate all grease fittings (see Lubrication Chart).
_____	3. Apply lubricant to standard open swing bearing and drive pinion gear (see Lubrication Chart). Check lubricant in optional oil bath swing bearing case, if so equipped, for proper level, and check for dirt or metal contamination (see Lubrication Chart).
_____	4. Inspect condition of hydraulic fluid in the reservoir. Fluid should have a clear amber color.
_____	5. Check hydraulic system for leaks, examine hoses for signs of excessive wear, chafing or twisting. Adjust the hoses and/ or replace them if necessary.
_____	6. Inspect the work platform and boom structure for signs of damage and broken welds. Check all bolts (including cab rotate bolts) for tightness.
_____	7. Check for machine damage, broken welds, loose bolts, improper or makeshift repairs.

Continued on following page . . .

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Boom trac cross braces breaking.	1. Hose skiving in the boom trac.	1. Check hydraulic pressure and adjust if necessary. See Section 2, Hydraulic Pump.
	2. System pressure too high, causing boom hoses to shrink more than normal.	2. Check hydraulic pressure and adjust if necessary. See Section 2, Hydraulic Pump.
	3. Hoses too tight in the trac.	3. Adjust hose tension. See Section 4, Boom.
• Boom trac sagging.	1. Trac pin holes stretched usually caused by a damaged "I" beam support.	1. Check "I" beam support and replace if necessary. See Section 4, Boom.
	2. Overhead guard is damaged. If the guard is damaged, the trac could get caught and could also tear off the moving anchor.	2. Replace overhead guard and any other items damaged due to a damaged guard. See Section 4, Boom.
	3. Improper lubrication and cleaning.	3. Follow proper lubrication and cleaning procedures. See Lubrication Chart.
• Engine won't crank.	• Starter motor relay, starter motor interlock relay , low oil pressure/ high water temperature/ time delay relay, Power relay, ground/ platform switch, ground toggle, platform ignition and start is bad or an engine failure.	• A breakdown in any one of these components will cause the engine not to crank. Trace the available voltage to starter motor relay. Replace the component(s) that are bad. See Section 3, Electrical and Electrical Schematic.

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